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Job No.: CTCE/BBMP/W.No.09/BBU/WMM/Gradation/2016-17 : 04.04.2016

GRADATION FOR WMM
MORTH TABLE-400-11

Customer : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **Mr. B. B. Umesh,**
#385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.

Name of Work : Improvements and Asphalting to Roads at APC layout, Lakeshore Garden and Hanuman layout in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/220/2015-16 Dated: 16.02.2016

Date of Testing : 04.04.2016

Material : WMM

Sample Location : WMM Mix Plant Oven Dry Wt (gm): **7575**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	230	230	3.0	97.0	95-100
22.4	2650	2880	38.0	62.0	60-80
11.2	1150	4030	53.2	46.8	40-60
4.75	985	5015	66.2	33.8	25-40
2.36	900	5915	78.1	21.9	15-30
0.600	785	6700	88.4	11.6	8-22
0.075	650	7350	97.0	3.0	0-8

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Job No.: CTCE/BBMP/W.No.09/BBU/WMM/Gradation/2016-17 : 06.04.2016

GRADATION FOR WMM
MORTH TABLE-400-11

Customer : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **Mr. B. B. Umesh,**
#385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.

Name of Work : Improvements and Asphalting to Roads at APC layout, Lakeshore Garden and Hanuman layout in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/220/2015-16 Dated: 16.02.2016

Date of Testing : 06.04.2016

Material : WMM

Sample Location : WMM Mix Plant Oven Dry Wt (gm): **7955**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	130	130	1.6	98.4	95-100
22.4	2515	2645	33.2	66.8	60-80
11.2	1095	3740	47.0	53.0	40-60
4.75	1020	4760	59.8	40.2	25-40
2.36	995	5755	72.3	27.7	15-30
0.600	900	6655	83.7	16.3	8-22
0.075	850	7505	94.3	5.7	0-8

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Job No.: CTCE/BBMP/W.No.09/BBU/WMM/Gradation/2016-17 : 11.04.2016

GRADATION FOR WMM
MORTH TABLE-400-11

Customer : **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : **Mr. B. B. Umesh,**
#385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.

Name of Work : Improvements and Asphalting to Roads at APC layout, Lakeshore Garden and Hanuman layout in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/220/2015-16 Dated: 16.02.2016

Date of Testing : 11.04.2016

Material : WMM

Sample Location : WMM Mix Plant Oven Dry Wt (gm): **7295**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	135	135	1.9	98.1	95-100
22.4	2250	2385	32.7	67.3	60-80
11.2	1310	3695	50.7	49.3	40-60
4.75	985	4680	64.2	35.8	25-40
2.36	905	5585	76.6	23.4	15-30
0.600	890	6475	88.8	11.2	8-22
0.075	620	7095	97.3	2.7	0-8

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Job No.: CTCE/BBMP/W.No.09/BBU/WMM/AIV/2016-17

04.04.2016

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
Name of the Work	Improvements and Asphalting to Roads at APC layout, Lakeshore Garden and Hanuman layout in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/220/2015-16 Dated: 16.02.2016
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	04.04.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	379	382	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	78	79	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	301	303	
4	Aggregate Impact value = percent fines	20.58	20.68	
	100* (W_2/W_1)%			**21.00**

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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Job No.: CTCE/BBMP/W.No.09/BBU/WMM/S-T/2016-17 04.04.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
Name of Work	Improvements and Asphalting to Roads at APC layout, Lakeshore Garden and Hanuman layout in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/220/2015-16 Dated: 16.02.2016
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	04.04.2016

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Result : Flakiness Index = **11.26%**

Elongation Index = **13.20%**

Result : Combined Flakiness & Elongation index = 24.46%

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/AIV/2016-17 30.04.2016

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
Name of the Work	Improvements and Asphalting to Roads at APC layout, Lakeshore Garden and Hanuman layout in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/220/2015-16 Dated: 16.02.2016
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
28.07.2014	30.04.2016

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	389	382	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	80	81	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	309	301	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	20.57	21.20	20.88

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/Shape_T/2016-17 : 30.04.2016

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	: **Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	: **Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
Name of Work	: Improvements and Asphalting to Roads at APC layout, Lakeshore Garden and Hanuman layout in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	: EE/BTP/BBMP/E-PMT/220/2015-16 Dated: 16.02.2016
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 30.04.2016

Result : Flakiness Index = **11.10%**

Elongation Index = **13.65%**

Result : Combined Flakiness & Elongation index **24.75%**

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.11/BBU/SDBC/Stripping/2015-16 30.04.2016

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Customer	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
Name of the work	Improvements and Asphalting to Roads at APC layout, Lakeshore Garden and Hanuman layout in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/220/2015-16 Dated: 16.02.2016
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	30.04.2016

Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.4	3.43	96.57
2	3.6		
3	3.3		

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/Sp_Wa/2016-17

30.04.2016

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Client	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	**Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
Name of the Work	Improvements and Asphalting to Roads at APC layout, Lakeshore Garden and Hanuman layout in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/220/2015-16 Dated: 16.02.2016
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	30.04.2016

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2028	2026	2024	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1273	1271	1269	
4	Weight of saturated surface dry aggregate in air	W_3 g	2020	2018	2023	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	747	747	754	
6	Weight of oven dried aggregate	W_4 g	1999	2000	2015	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.676	2.677	2.672	2.675
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.753	2.743	2.701	2.733
9	Water Absorption	$((W_3-W_4)*100)/W_4$	1.05%	0.90%	0.40%	0.78%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/Bitumen/2016-17 30.04.2016

BITUMEN CONTENT AND GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS2386 and IRC:SP:11-1984

CLIENT	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
NAME OF THE WORK	Improvements and Asphalting to Roads at APC layout, Lakeshore Garden and Hanuman layout in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-PMT/220/2015-16 Dated: 16.02.2016
SAMPLE I/D	Roads in APC layout in Ward No.09, BBMP, Bangalore.
DATE OF TESTING	30.04.2016

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	475.5	473.5
3. Weight of Asphalt and Mineral matter Extracted,	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	24.5	26.50
7. Bitumen content in %	4.90	5.30
8. Average	**5.10**	

GRADATION AFTER EXTRACTION

SIEVE SIZE	Trail 1				JOBMIX
mm	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	Gradation
13.2	0	0	0	100	100
9.5	32.35	6.80	6.80	93.20	90-100
4.75	251.5	52.89	59.70	40.30	35-51
2.36	34.69	7.30	66.99	33.01	24-39
1.18	43.25	9.10	76.09	23.91	15-30
0.3	46.35	9.75	85.83	14.17	9-19
0.075	38.56	8.11	93.94	6.06	3-8

SIEVE SIZE	Trail 2				JOBMIX
mm	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	Gradation
13.2	0	0	0	100	100
9.5	33.36	6.67	6.67	93.33	90-100
4.75	258.8	51.76	58.43	41.57	35-51
2.36	56.35	11.27	69.70	30.30	24-39
1.18	46.32	9.26	78.97	21.03	15-30
0.3	35.85	7.17	86.14	13.86	9-19
0.075	40.22	8.04	94.18	5.82	3-8

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Job No.: CTCE/BBMP/W.No.09/BBU/SDBC/Bitumen/2016-17 02.05.2016

BITUMEN CONTENT AND GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX
As per IS2386 and IRC:SP:11-1984

CLIENT	**Asst. Executive Engineer,** Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	**Mr. B. B. Umesh,** #385/1, Near Anjaneya Temple, Bettahalasur Village & Post, Bangalore – 57.
NAME OF THE WORK	Improvements and Asphalting to Roads at APC layout, Lakeshore Garden and Hanuman layout in Ward No.09 in Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-PMT/220/2015-16 Dated: 16.02.2016
SAMPLE I/D	Roads in APC layout in Ward No.09, BBMP, Bangalore.
DATE OF TESTING	02.05.2016

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	474.9	474.3
3. Weight of Asphalt and Mineral matter Extracted,	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	25.1	25.70
7. Bitumen content in %	5.02	5.14
8. Average	**5.08**	

GRADATION AFTER EXTRACTION

SIEVE SIZE	Trail 1				JOBMIX
mm	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	Gradation
13.2	0	0	0	100	100
9.5	33.25	7.00	7.00	93.00	90-100
4.75	259.6	54.66	61.67	38.33	35-51
2.36	38.62	8.13	69.80	30.20	24-39
1.18	42.35	8.92	78.72	21.28	15-30
0.3	45.31	9.54	88.26	11.74	9-19
0.075	30.29	6.38	94.63	5.37	3-8

SIEVE SIZE	Trail 2				JOBMIX
mm	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	Gradation
13.2	0	0	0	100	100
9.5	32.36	6.47	6.47	93.53	90-100
4.75	260.5	52.10	58.57	41.43	35-51
2.36	55.65	11.13	69.70	30.30	24-39
1.18	48.25	9.65	79.35	20.65	15-30
0.3	36.98	7.40	86.75	13.25	9-19
0.075	41.22	8.24	94.99	5.01	3-8

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